What is claimed is:

1   1. Interferometric apparatus comprising:

2   means for defining a reference frame;

3   a translation stage;

4   an electro-mechanical arrangement for selectively translating said translation
5 stage in at least one of at least two orthogonal directions with respect to said
6 reference frame;

7   at least one thin, elongated mirror mounted in a predetermined manner with
8 respect to said reference frame, said at least one thin, elongated mirror having a
9 reflecting surface and a nominal datum line extending along its longitudinal
10 dimension;

11   at least one interferometer subsystem mounted in a predetermined manner
12 with respect to said at least one thin, elongated mirror; adapted to cooperate with said
13 at least one thin, elongated mirror to measure the displacement of said translation
14 stage in at least one azimuth; and adapted to measure the local slope of said at one
15 thin, elongated mirror along and orthogonal to its datum line and its local
16 displacement normal to said reflecting surface;

17   control means having a mode of operation for selectively translating said
18 translation stage, said at least one thin, elongated mirror and said at least one
19 interferometer subsystem moving relative to one another in said mode of operation so
20 that said at least one interferometer subsystem scans said at least one thin, elongated
21 mirror along its corresponding datum line to generate a signal containing information
22 indicative of the angular change and surface departure of said reflecting surface
23 thereof along with any contributions thereto due to variations present from said
24 electro-mechanical arrangement per se; and

25   signal and analysis means for extracting said information contained in said
26 signal and determining the local shape of said at least one thin, elongated mirror while
27 said control means is in said mode of operation.

1   2. The interferometric apparatus of claim 1 wherein said at least one thin,
2 elongated mirror is mounted to said translation stage for movement therewith and said
3 at least one interferometer subsystem is fixedly mounted off said translation stage.

1　　3. The interferometric apparatus of claim 1 wherein said at least one
2　interferometer subsystem is fixedly mounted to said translation stage for movement
3　therewith and said at least one thin, elongated mirror is fixedly mounted off said
4　translation stage.

1　　4. The interferometric apparatus of claim 1 wherein said control means is
2　structured and arranged to have another mode of operation in which the motion of
3　said translation stage is measured in at least one azimuth with respect to said
4　reference frame.

1　　5. The interferometric apparatus of claim 1 comprising at least two, thin
2　elongated mirrors having reflecting surfaces orthogonally arranged with respect to one
3　another and each including a nominal datum line extending along its longitudinal
4　dimension and at least two interferometer subsystems at least in part mounted off
5　said translation stage, each of said at least two interferometer subsystems being
6　adapted to scan a corresponding one of said thin, elongated mirrors and configured to
7　measure the local slope of the scanned mirror along and orthogonal to its datum line
8　and its local displacement normal to said reflecting surface, said control means being
9　further configured in said mode of operation to selectively translate said translation
10　stage in one or all of its possible directions of motion so that at least one of said
11　interferometer subsystems scans a corresponding one of said thin, elongated mirrors
12　along its corresponding datum line to generate a signal containing information
13　indicative of the angular change and surface departure of its corresponding reflecting
14　surface along with any contributions thereto due to variations present from said
15　electro-mechanical arrangement per se while the other of said interferometer
16　subsystems generates a signal containing at least information about the angular
17　change of said translation stage, said signal combining and analysis means extracting
18　information contained in said signals and determining the local shape of said at least
19　two thin, elongated mirrors.

　　6. The apparatus of claim 1 wherein said at least one interferometer
subsystem comprises a single beam, plane mirror interferometer subsystem.

1   7.   The interferometric apparatus of claim 1 wherein said interferometric
2   apparatus comprises three orthogonally arranged thin, elongated mirrors and three
3   corresponding interferometer subsystems mounted for relative motion with respect to
4   one another while said control means is in said mode of operation to measure the
5   local shape of said mirrors in three dimensions.

    8.   The interferometric apparatus of claim 1 further including a photolithographic wafer mount located on said translation stage for movement therewith.

    9.   The interferometric apparatus of claim 8 further including a photolithographic exposure unit fixedly mounted to said reference frame for forming masked patterns on wafers located on said translation stage.

1   10. Interferometric method comprising the steps of:
2   defining a reference frame;
3   providing a translation stage for movement with respect to said reference
4   frame;
5   selectively translating said translation stage in at least one of at least two
6   orthogonal directions with respect to said reference frame;
7   mounting at least one thin, elongated mirror in a predetermined manner with
8   respect to said reference frame, said at least one thin, elongated mirror having a
9   reflecting surface and a nominal datum line extending along its longitudinal
10   dimension;
11   mounting at least one interferometer subsystem in a predetermined manner
12   with respect to said at least one thin, elongated mirror where said at least one
13   interferometer subsystem is adapted to cooperate with said at least one thin,
14   elongated mirror to measure the displacement of said translation stage in at least one
15   azimuth and is also adapted to measure the local slope of said at one thin, elongated
16   mirror along and orthogonal to its datum line and its local displacement normal to said
17   reflecting surface;
18   selectively translating said translation stage in a mode of operation in which
19   said at least one thin, elongated mirror and said at least one interferometer subsystem
20   movie relative to one another in said mode of operation so that said at least one

-21-

21   interferometer subsystem scans said at least one thin, elongated mirror along its

22   corresponding datum line to generate a signal containing information indicative of the

23   angular change and surface departure of said reflecting surface thereof along with

24   any other contributions thereto due to variations present during said step of selectively

25   translating said translation stage; and

26   extracting said information contained in said signal and determining the local

27   shape of said at least one thin, elongated mirror while is in said mode of operation.

1   11.   The interferometric method of claim 10 wherein said at least one thin,

2   elongated mirror is mounted to said translation stage for movement therewith and said

3   at least one interferometer subsystem is fixedly mounted off said translation stage.

1   12.   The interferometric method of claim 10 wherein said at least one

2   interferometer subsystem is fixedly mounted to said translation stage for movement

3   therewith and said at least one thin, elongated mirror is fixedly mounted off said

4   translation stage.

1   13.   The interferometric method of claim 10 having another mode of operation

2   in which the motion of said translation stage is measured in at least one azimuth with

3   respect to said reference frame.

1   14.   The interferometric method of claim 10 in which there are provided at

2   least two, thin elongated mirrors having reflecting surfaces orthogonally arranged with

3   respect to one another with each including a nominal datum line extending along its

4   longitudinal dimension and at least two interferometer subsystems at least in part

5   mounted off said translation stage, each of said at least two interferometer

6   subsystems being adapted to scan a corresponding one of said thin, elongated

7   mirrors and configured to measure the local slope of the scanned mirror along and

8   orthogonal to its datum line and its local displacement normal to said reflecting

9   surface, said method being further configured in said mode of operation to selectively

10   translate said translation stage in one or all of its possible directions of motion so that

11   at least one of said interferometer subsystems scans a corresponding one of said

12   thin, elongated mirrors along its corresponding datum line to generate a signal

13   containing information indicative of the angular change and surface departure of its

14 corresponding reflecting surface along with any contributions thereto due to variations

15 present from any other contributions present during said step of selectively translating

16 said translation stage while the other of said interferometer subsystems generates a

17 signal containing at least information about the angular change of said translation

18 stage, said step of extracting information contained in said signals determining the

19 local shape of said at least two thin, elongated mirrors.

15. The interferometric method of claim 10 wherein said at least one interferometer subsystem comprises a single beam, plane mirror interferometer subsystem.

1 16. The interferometric method of claim 10 in which there are provided three

2 orthogonally arranged thin, elongated mirrors and three corresponding interferometer

3 subsystems mounted for relative motion with respect to one another while in said

4 mode of operation to measure the local shape of said mirrors in three dimensions.

17. The interferometric method of claim 10 further including the step of mounting a photolithographic wafer on said translation stage for movement therewith.

1 18. The interferometric method of claim 17 further including

2 photolithographically exposing said wafer from said reference frame with masked

3 patterns of illumination.